P1.24 EARTH2CLASS: BRINGING TOGETHER TEACHERS, SCIENTISTS, AND SCIENCE

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1. INTRODUCTION

Earth2Class Workshops for Educators at the Lamont-Doherty Earth Observatory of Columbia University (E2C) is a unique professional development program that allows classroom teachers to enhance their skills and knowledge about Earth Science through interactions with research scientists, new educational technology programs, Internet-based activities and other resources.

E2C evolved from a simple series of Saturday workshops for teachers created in part to provide AMS "Maury Project" training modules into its present, extensive format. Previous series of this program were described in the 9th and 10 Symposia on Education (Passow, 2000, 2001a-d.) This year's poster features highlights from the 2000 – 2001 series and plans for the current academic year.

2.1 FORMAT OF THE PROGRAM

E2C enhances the knowledge, teaching, and technology skills of middle and high school science educators through "live" workshops featuring L-DEO researchers describing their cutting-edge investigations, preceded by an introductory presentation concerning the session theme and followed up by activities that develop classroom and educational technology applications.

Workshop sessions were held in the Seismology Building on the Lamont-Doherty campus in Palisades NY, about fifteen kilometers north of New York City.

Through teleconferencing links, we are able to provide these programs to educators who are unable to attend the Saturday morning presentations at L-DEO. Our web site, **www.earth2class.org**, provides anyone interested with archived versions of scientist and background presentations, educational and classroom activities, resources, and much more.

The general structure for Earth2Class workshops is:

9:00 – 9:30 Technology set-up and general announcements
9:30 – 10:15 Background information about the session theme
10:30 – 11:30 Presentation by guest scientist(s)
11:45 – 12:30 Educational technology and classroom applications
12:30 – 1:00 Wrap-up activities for course participants.

The background information and classroom applications are generally the responsibility of Passow, an Earth Science teacher, Adjunct Professor of Science Education at Teachers College, and an AMS Education Program Peer Trainer. Educational technology applications are presented by Assumpcao, who recently received her doctoral degree in this area from Teachers College and has now returned to her home school in Brazil. Baggio has responsibility for the technology arrangements needed to teleconference and create archival versions of the sessions. Corder organizes distance learning arrangements with cooperating institutions.

All participants receive a certificate of attendance, which has enabled some to meet district requirements for professional development plans.

Arrangements were made during the Spring 2001 semester for those interested to receive 3 graduate credits through St. Thomas Aquinas College, Sparkill NY. The course, "Facilitating State Standards—Earth Science," included nine classes on campus in addition to the Saturday sessions. This course will be repeated during Spring 2002.

In the Fall 2001 semester, participants received credit through the Center for Educational Outreach and Innovation, Teacher College. Additional opportunities for E2C teachers to earn credit are being developed.

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2.2 2000—2001E2C WORKSHOP THEMES

Vital to the effectiveness of this or any similar program is selection of themes that are of direct connection to what classroom teachers must present to their students. One of the original goals when these Workshops were started was to enhance the subject content knowledge of teachers, especially in areas related to the atmospheric and oceanic sciences.

Many teacher-training modules developed through the Project Atmosphere, the Maury Project, and other AMS Education Program initiatives have been shared with attendees to accomplish such enhancement. In addition, other educational materials designed to expand science content have been distributed to participants, especially CD-ROMs developed by the Jet Propulsion Laboratory and the Ocean Drilling Project.

This conjunction of teachers, researchers, and science produces an exciting professional development experience. Listed below are the themes for the past academic year, featured scientist(s), and AMS Educational Program teacher-training modules incorporated into the session.

"Introduction to E2C and Educational Technology" (23 Sep 2000) Featured scientists: Benno Blumenthal, International Research Institute for Climate Prediction and Alex de Sherbinin, Center for International Earth Science Information Network (CIESIN). Educational technology featured: Trackstar and other Internet-based strategies.

"Rocks and Minerals" (28 Oct) Featured scientist: David Walker—"Using X-Ray Crystallography."

"Earthquakes and Other Natural Hazards" (11 Nov) Featured scientist: Arthur Lerner-Lam. AMS module: "Hazardous Weather.

"Core/Mantle Studies" (16 Dec) Based on the work of Paul Richards and presented by Michael J. Passow.

"Paleoclimatology" (27 Jan 2001) Featured scientist: Joseph D. Ortiz. AMS module: "Upwelling and Downwelling."

"Air-sea Interactions" (24 Feb) Featured scientist: Martin Visbeck. AMS module: "El Nino/La Nina."

"Ocean Winds" and "Deep-Sea Climate Records" (10 Mar) Featured scientists—Donna Witter—"Exploring Oceans with Satellites" and Rusty Lotti Bond—"The L-DEO Deep-Sea Core Repository." AMS modules: "Wind-Driven Currents" and "Density-Driven Currents."

"Sea Floor Structure and Evolution" (28 Apr) Featured scientists: Christopher Small and Gregory Mountain. AMS module: "Measuring Sea Level from Space."

"Hydrology" (12 May) Featured scientist: Upmanu Lall. Featuring an introduction to the upcoming AMS "Water in the earth Systems" program. (Several Earth2Class participants are among the first group studying WES with our Local Implementation Team.

2.3 2001–2002 E2C WORKSHOP THEMES

During the current academic year, we are repeating some of the themes from past programs, but also including new ones. There is also a greater emphasis on utilization of educational technology. Listed below are the themes, featured scientists, AMS modules, and focus of educational technology lessons for this year's series.

"Imaging the Earth" (22 Sep) Featured scientist: Benno Blumenthal, International Research Institute for Climate Prediction. Using maps, including online resources available through AMS DataStreme and "Water in the earth Systems" web sites, to enhance scientific and geographic knowledge. Educational technology portion introduced "The Monster Project," online program that helps students develop language arts skills through creating and then describing images.

"Rocks and Minerals" (20 Oct) Featured scientist: David Walker—"Soluble Salts of the Earth: Caves, Nuclear Waste Disposal, and the Evolution of the Core." Educational technology focus: web-based student activities about minerals and rocks, followed by continuation of "Monster Project" strategies.

"Seismology" (17 Nov) Featured scientist: Arthur Lerner-Lam—"How Predictable Are Natural Disasters?" AMS module: "Hazardous Weather." Educational technology applications include a web-based investigation developed by Dr. Passow, "Earthquakes on the Web," and student-oriented real-time data projects developed through the Stevens Institute of Technology.

"Wonders Under the Sea" (8 Dec) Featured scientist: Gerardo Iturrino, L-DEO Borehole Group/Ocean Drilling Project. AMS

training module: "Ocean Sound." Educational technology focus: creation of PowerPoint for enhanced visualization of content.

"Air/Sea Climate Patterns" (26 Jan 2002) Featured scientist: Martin Visbeck—"Why is Western Europe Warmer than Eastern Canada? Gulf Stream vs. Atmospheric Winds." AMS training module: "Wind-Driven Ocean Currents." Technology integration focus: Excel, Inspiration, Table Top and other tools to help students visualize data.

"Looking Back at Climate" (9 Feb) Featured scientists: Alexey Kaplan—"Developing Knowledge of Climate During the Past 150 Years" and Rusty Lotti Bond, Curator—"The L-DDEO Deep-sea Core Repository." AMS training module: "El Nino/La Nina" Technology focus: basic web page creation skills.

"Hudson River Studies" (9 Mar) Featured scientists: Robin Bell—"Digging Up the Dirt on the Hudson River" and Alex de Sherbinin—"Center for International Earth Science Information Network (CIESIN) Databases." Educational technology focus: developing criteria to evaluate the quality of student-oriented web sites.

"Exploring the Geology and Geophysics of the Ocean Floors" (13 Apr) Featured scientists: Christopher Small—"Remote Sensing of Our Planet" and Gregory Mountain—"Shipboard Studies of the Sea Bottom." AMS training module: "Measuring the Sea Level from Space." Educational technology feature: WebQuests.

"Water Resources" (11 May) Featured scientist: Upmanu Lall—"Case Studies of water Resource Issues." Educational technology focus: using the AMS "Water in the Earth Systems" web pages and wrap-up from previous sessions.

2.4 TELECONFERENCING AND DISTANCE LEARNING THROUGH E2C

During the 2000 – 2001 academic year, opportunities were provided to teachers far from the L-DEO campus to participate in these Workshops through synchronous broadcasts arranged by the North Hudson Electronic Educational Empowerment Project and the Distance Learning Project of Teachers College. Plans are being developed for an expanded teleconferencing through other programs; however, at the time this article was written, final arrangements have not been completed, but will be featured in the poster.

Each session involving teleconferencing requires a two-way link between the L-DEO Seismology Seminar Room and the remote site, so that participants at both locations can easily ask questions of the scientists and work through the classroom and educational technology application lessons.

In addition, all sessions are videotaped for future editing into modules that will enable asynchronous distance learning capability, once suitable funding has been identified.

3.1 WWW.EARTH2CLASS.ORG

The project's Internet site has been developed largely by Assumpcao and Baggio. A visitor to the site during the current series will find eight choices. "Curriculum Activities" provide the background information about the session theme, along with some classroom-oriented activities developed by Passow. The guest scientist's contributions are available through the "Earth Science Content" link. Featured "Technology Integration" and "Resources" are found through other links. For those registered for credit, there is a "Class Assignment" section. Opportunities exist to provide "Evaluate" and interact with other participants through the "Virtual Classroom." There is also a "Multimedia" link for suitable materials.

Other sections of www.earth2class.org provide archived versions of Workshops in previous series, links to many URLs and other web-based activities, and other useful resources. These include grant opportunities for classroom-based technology. The "Mentoring" section provides examples of technology-based classroom activities developed by E2C participants.

In the future, we hope to provide an expanded distance learning program that will enable interested teachers to experience these Workshops through asynchronous learning opportunities.

3.2 EVALUATION OF E2C

Assumpcao utilized the 2000 –2001 programs as the basis for her doctoral dissertation at Teachers College. The evaluations provided by the participants following each session were essential aspects of her research. Examples will be included in the poster.

Feedback about Earth2Class has also been gathered through our workshop presentations at recent conventions of the Society for Information Technology and Teacher Education International National Science Teachers Association; Westchester Conference on Science, Math, and Technology Education (Purchase College, State University of New York); and others.

3.3 SUPPORT FOR EARTH2CLASS

Support from the Lamont-Doherty Earth Observatory has been critical for the continuation of Earth2Class. Before this program, few opportunities existed for teachers to learn about cutting-edge ideas directly from L-DEO researchers. When what became Earth2Class began in 1998, only three scientists agreed to participate. As the wide range of themes listed above indicates, this program has been evaluated by the L-DEO community and become widely accepted as an important part of the institution's K – 12 outreach. For this, we especially appreciate the support of Dr. John Mutter and Dr. Michael Purdy, as well as from the scientists who have shared their expertise with E2C teachers.

Additional support, especially in making their members aware of this opportunity, has been received from the Science Teachers Association of New York State/Westchester Section, National Association of Geoscience Teachers/Eastern Section, and New Jersey Earth Science Teachers Association.

Dr. Rob Steiner of the Distance Learning Project, Teachers College, has provided technology logistic support.

4. REFERENCES

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